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Solar, Wind, and State Mandates: 10 Years of Renewable Energy in the NSEE

Introduction

When the National Surveys on Energy and Environment (NSEE) was launched in 2008, the nation derived just 3% of its electricity from non-hydro renewable energy sources.[1] A decade later, that number has more than tripled to an estimated 10%.[2] While that may seem like a small feat, it represents construction of over 62 gigawatts (GW) of new wind capacity and 26 GW of new solar capacity.[3] This growth in renewable energy has largely been attributed to both government policy—especially state-level renewable portfolio standards[4]—and the changing economics of renewable energy.[5]

This report considers how American attitudes about renewable energy policies—and solar and wind energy, more specifically—have changed over the last decade. We use time-series data to consider shifts in support for state-level renewable energy requirements and the extent to which Americans are willing to pay more for renewable energy. We also look at whether or not Americans support increased use of solar and wind energy outside of the context of state mandates, and their perceptions of the positive and negative impacts of these energy sources.

NSEE @10

Since 2008, the University of Michigan and Muhlenberg College have conducted the National Surveys on Energy and Environment (NSEE), a biannual national opinion survey on energy and climate policy. To celebrate the tenth anniversary of the survey, throughout 2018 NSEE will be releasing a series of reports highlighting the breadth of topics we have covered over the past decade. These reports present time-series data on how American attitudes about energy policy and climate change have changed from 2008 to 2017, as well as comparisons to Canadian opinion, collected through a parallel survey conducted by researchers at the University of Montreal. You can find previous reports in this series at: www.closup.umich.edu/nsee

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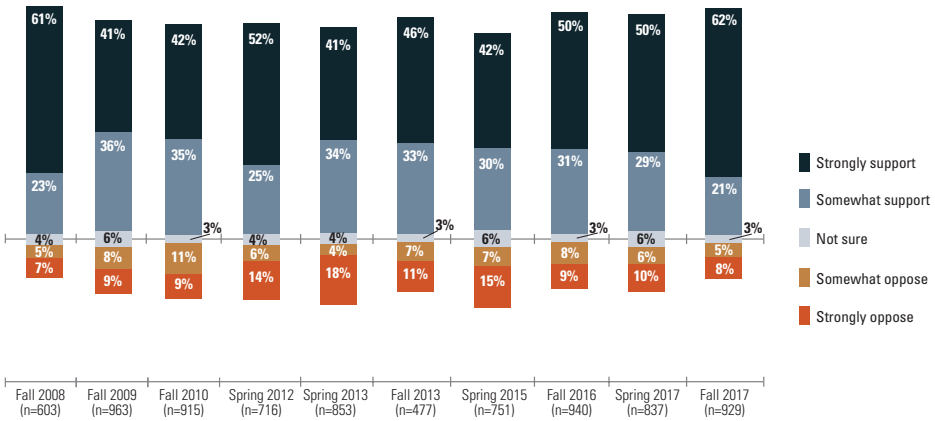
Consistently High Support for State Renewable Energy Requirements

For the last two decades, the policy of choice for U.S. states interested in actively promoting a shift to renewable energy has been the renewable portfolio standard (RPS). In general terms, this policy tool requires electric utilities operating within a state to increase the proportion of electricity that comes from renewable sources by a set deadline. Currently, 29 states plus the District of Columbia have a compulsory RPS in place, while eight more states have voluntary standards or renewable energy goals.[6] While the federal production tax credit has played a role in incentivizing the growth in renewable energy production across the country,[7] these state-level RPSs have largely been credited with further increasing renewable energy production, especially in some regions of the country.[8] Though the last decade has seen a number of attempts to roll back RPS provisions or allow them to expire, few such attempts have succeeded (this discussed in more detail in a June 2015 NSEE report).[9] Instead, more commonly, states have successfully renewed or expanded renewable energy requirements.[10]

The expansion of RPS policies is unsurprising, given the high support they enjoy with the public. Over the last decade, the NSEE has found consistently high support for state-level renewable energy requirements, with support ranging from 72% to 84% (see *Figure 1*). While overall support for the policy was highest (84%) in the very first NSEE wave (Fall 2008), strong support hit a new high on the latest survey fielded a decade later in Fall 2017. On this latest wave, 62% of Americans say they strongly support states requiring increased use of renewable energy sources and another 21% say they somewhat support such requirements. By contrast, only 13% of Americans say they oppose such renewable energy requirements on this latest survey. Even at the peak of opposition on the Spring 2013 and Spring 2015 surveys, just 22% of Americans said they were opposed to state-level renewable energy requirements.

Figure 1. Support/opposition to states requiring increased use of renewable energy[a]



Source: Fall 2008 – Fall 2017 NSEE waves. Survey data tables for all NSEE waves are available at http://closup.umich.edu/national-surveys-on-energy-and-environment/

Note: Fall 2010 and Spring 2015 waves originally used an agree/disagree scale.

a Question text (Fall 2008, Spring 2013): "There have been a number of ideas proposed for how state governments can reduce the emissions of greenhouse gases. For each idea that I mention please tell me if you strongly support, somewhat support, somewhat oppose, or strongly oppose the proposed ways states can reduce greenhouse gas emissions: State governments should require a set portion of all electricity to come from renewable energy sources such as wind, solar, or hydroelectric power."
Question text (Fall 2009, Fall 2013, Fall 2017): "There have been a number of ideas proposed for how state governments can reduce the emissions of greenhouse gases. For each idea that I mention please tell me if you strongly support, somewhat support, somewhat oppose, or strongly oppose the proposed ways states can reduce greenhouse gas emissions: State governments should require a set portion of all electricity to come from renewable energy sources such as wind and solar power."
Question text (Fall 2010): "Please identify your level of agreement with the following statements. For each statement please indicate if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree: My state should require increased use of renewable energy."
Question text (Spring 2012): "In order to reduce the emission of greenhouse gases a number of methods have been considered. For each of the methods of reducing greenhouse gas emission that I mention please indicate if you strongly support, somewhat support, somewhat oppose, or strongly oppose that option. Next, a policy to reduce greenhouse gases by requiring a set portion of all electricity to come from renewable energy sources such as wind, solar, or hydroelectric power."
Question text (Spring 2015): "Please identify your level of agreement with the following statements regarding energy policy. For each statement please indicate if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree. State governments should require a set portion of all electricity to come from renewable energy sources such as wind and solar power."
Question text (Fall 2016): "There have been a number of ideas proposed for how governments can reduce the emissions of greenhouse gases. For each of the following policy options I read please indicate if you strongly support, somewhat support, somewhat oppose, or strongly oppose that option. Next, requiring a set portion of all electricity to come from renewable energy sources such as wind or solar power."
Question text (Spring 2017): "Now I would like to ask you a few questions about government policy designed to reduce greenhouse gas emissions. For each of the following policy options I read please indicate if you strongly support, somewhat support, somewhat oppose, or strongly oppose your state adopting that policy as a means of reducing emissions? Requiring a set portion of all electricity to come from renewable energy sources such as wind and solar in your state."

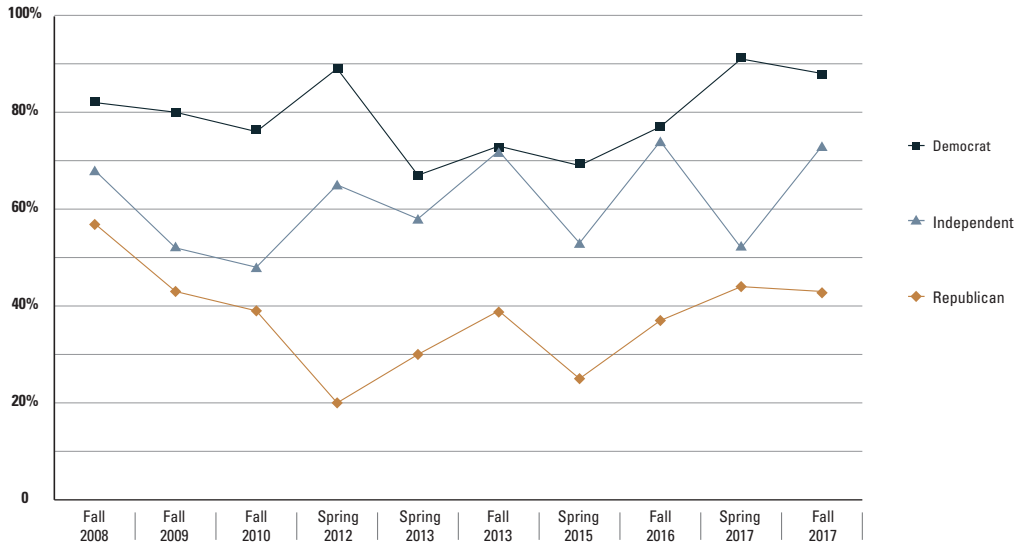
Majority Support Across Political Lines for Renewable Energy Requirements

This high support for state renewable energy requirements spans the political spectrum. On each of the 10 surveys on which the question was asked, an outright majority of Democrats, Independents, and Republicans have said they support states requiring increased use of renewable energy, often by wide margins.

The narrowest margin—of 20 percentage points—was posted by Republicans on the Spring 2012 survey (see *Figure 2a*). On that wave 58% of Republicans said they supported state renewable energy requirements compared to 38% who opposed such requirements, for 20% net support. More commonly, Republicans in support of state renewable energy requirements have outnumbered those in opposition two-to-one. For example, on the latest Fall 2017 survey, 69% of Republicans say they support increased renewable energy requirements compared to just 26% who oppose such requirements, for 43% net support.

Support for state renewable energy requirements has consistently been even higher among Democrats, with net support above 67% on each of the NSEE surveys. Opposition to state renewable energy requirements peaked among Democrats in Spring 2013, but even then, just 14% of Democrats said they opposed the policy. On the most recent NSEE wave, 5% of Democrats say they oppose renewable energy requirements compared to 93% in support of such requirements, for a near-record 88% net support.

Figure 2a. Net support for states requiring increased use of renewable energy, by political affiliation[a]



Source: Fall 2008 – Fall 2017 NSEE waves

Note: see Note 11 on page 22 for the sample size for each of the groups shown in the figure

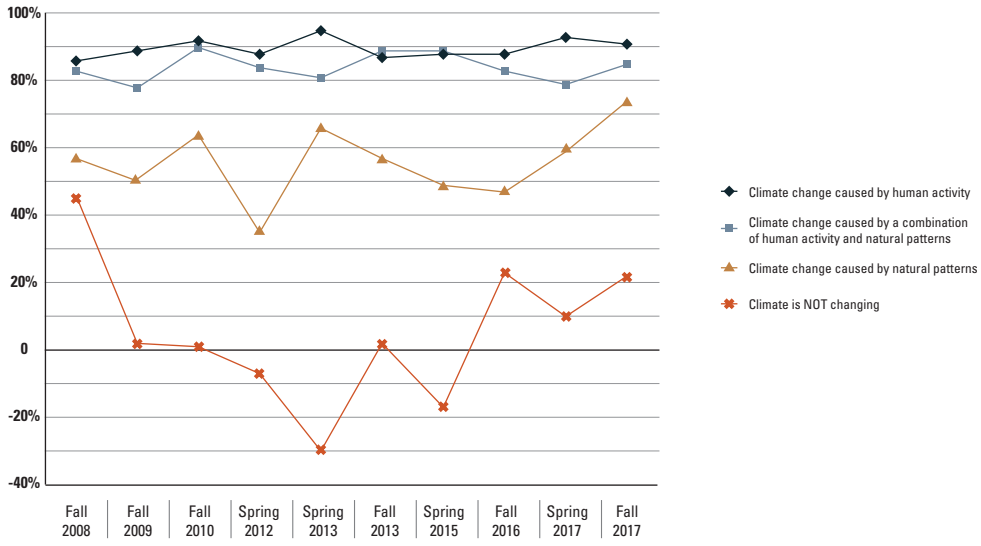
Recent Waves Find Majority Support for Renewable Energy Requirements Even Among Those Who Doubt Climate Change is Occurring

As the NSEE has found for other climate policies,[12] support for state-level renewable energy requirements is highest among those who believe climate change is primarily—or at least partially—caused by human activity. On the most recent survey, for example, nearly all (95%) of those who ascribe to anthropogenic climate change—that is, who say that it is primarily caused by humans—say they support increased renewable energy requirements. Among those who say climate change is caused by a combination of human activity and natural patterns, 91% support state renewable energy requirements.

In contrast to other climate policies, though, renewable energy requirements also find high support among those who believe climate change to be primarily caused by natural patterns. On the latest Fall 2017 survey, 86% of Americans who say climate change exists but is caused by natural patterns say they support state renewable energy requirements. Over the last decade, the margin of support among this group has been at least 35%, and more commonly above 50% (see *Figure 2b*).

Even more notably, on seven of the 10 NSEE waves which carried this policy question, there was more support than opposition (i.e., net support), even among those who say that climate change is not happening. In particular, there has been majority support among this group since Fall 2016. On the latest survey, 58% of those who say Earth's climate is not changing say they support states requiring increased use of renewable energy.

Figure 2b. Net support for states requiring increased use of renewable energy, by stance toward climate change[a,b,c]



Source: Fall 2008 – Fall 2017 NSEE waves

Note: see Note 13 on page 23 for the sample size for each of the groups shown in the figure

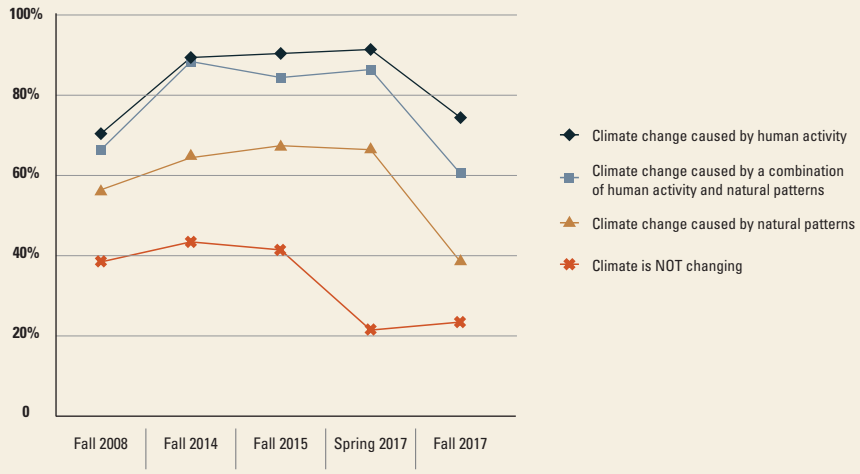
b Question text (belief in climate change): "From what you've read and heard, is there solid evidence that the average temperature on earth has been getting warmer over the past four decades?"

c Question text (cause of climate change): "Is the earth getting warmer because of human activity such as burning fossil fuels, or mostly because of natural patterns in the earth's environment?" While asked as a two- option close-ended question (i.e., human activity or natural patterns), interviewers record when respondents volunteer that climate change is a "combination of human activity and natural patterns."

Support for Energy Efficiency Requirements

Though they receive less attention by energy policy researchers (including the NSEE), 20 U.S. states have policies requiring utilities to increase energy efficiency and another eight states have energy efficiency goals.[14] The NSEE has asked about these energy efficiency requirements—often referred to as energy efficiency resource standards (EERSs)—on five occasions, each time finding that EERSs enjoy an even broader base of support than their renewable energy counterparts. Overall support for energy efficiency requirements is roughly equivalent to renewable energy requirements, ranging from 71% to 84%. But most notably, the NSEE has found net support for EERSs on each of these waves across the political spectrum, regardless of stance on climate change. While those who express doubt in climate change have oscillated between net support and net opposition to renewable energy requirements (recall *Figure 2b*), the NSEE has found net support for energy efficiency requirements among climate skeptics to exceed 20% (see figure below). This matches a related finding with respect to vehicle emissions standards: framing these standards as "fuel efficiency" appeals to a wider range of Americans than framing them as a means of greenhouse gas reductions.[15]

Net support for states requiring increased energy efficiency, by stance toward climate change



Source: Fall 2008 – Fall 2017 NSEE waves

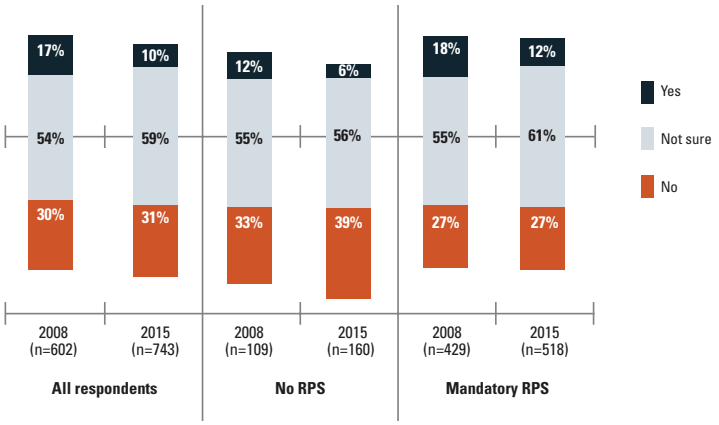
Note: Question text varied slightly for each of these waves. See Note 16 on page 24 for question text as well as the sample size for each of the groups shown in the figure

Most Americans Don't Know Their State's RPS Status

Despite broad-based support among Americans for state renewable energy requirements, the NSEE finds strong evidence that this is not a policy issue that Americans follow closely. On two NSEE survey waves, respondents were asked whether or not their state has a renewable energy requirement. On both surveys, more than half of respondents volunteered that they were not sure (see *Figure 3*).

For respondents living in the eight states with a voluntary renewable portfolio standard (RPS), this may have been a difficult question to answer: Is a voluntary goal a requirement? However, even among respondents in states which very clearly have either no RPS policy or a mandatory standard, there are still very high levels of "not sure" responses. Furthermore, even those who do substantively answer the question are mostly likely to say they live in a state that has no renewable energy requirement, regardless of their state's RPS status. In Spring 2015, for example, twice as many respondents living in a state with a mandatory RPS incorrectly answered that their state has no renewable energy requirement (27%) than correctly answered that their state does have such a requirement (12%). Even if respondents were just guessing at random, one would statistically not expect such a result.

Figure 3. Belief that one's state has a renewable energy requirement, by RPS status[d]



Source: Fall 2008 and Spring 2015 NSEE waves

Note: States with no RPS are: AK, AL, AR, DC, FL, GA, ID, KY, LA, MS, NE, TN, WV, WY

States with mandatory RPS are: AZ, CA, CO, CT, DE, HI, IA, IL, MA, MD, ME, MI, MN, MO, MT, NC, NH, NJ, NM, NV, NY, OH, OR, PA, RI, TX, VT, WA, WI

d Question text (Fall 2008): "Some states have required that a portion of the electricity produced in that state should be from renewable sources such as wind, solar, or hydroelectric power. Does your state have a requirement for the production of renewable energy?"

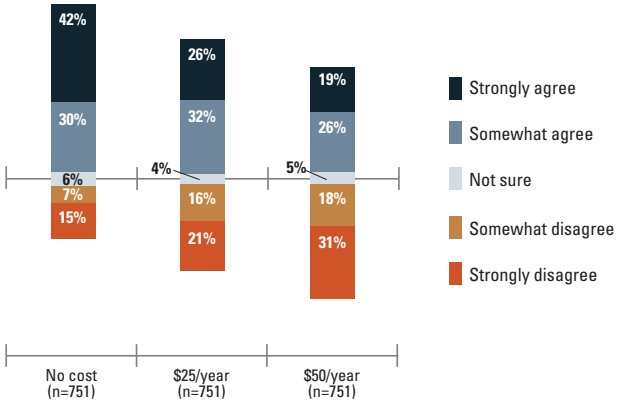
Question text (Spring 2015): "Next, some states have required that a set portion of the electricity produced in that state should be from renewable sources such as wind or solar power. Does your state have a requirement for the production of renewable energy?"

Putting a Cost on Renewable Energy Requirements Decreases Support Among All Groups

In survey research, it is common to find that support for a policy drops once a price tag is attached to the policy. Assigning a price to a state-level renewable energy requirement, though, is difficult, as the cost of existing policies varies greatly across states, based on a number of factors related to renewable resources' availability and the price of non-renewable energy sources.[17] In many places, utility-scale wind and solar are currently less expensive than conventional fuels, but this is not necessarily the case in all states with renewable energy requirements. Furthermore, while the cost of renewable energy is projected to continue to decrease in coming years compared to conventional fuels, state policies that call for high levels of renewables may require storage, which negates some of this cost advantage.[18]

In order to test how supportive Americans are for a renewable energy requirement that might increase the cost of electricity, the NSEE ran a battery of three sequential questions on the Spring 2015 survey (see *Figure 4a*). The first question asked about support and opposition to a state renewable energy requirement with no cost mentioned; this is the same data that was also presented in *Figures 1* and *2*, which found 72% support and 22% opposition. The second question told respondents that the policy would increase electricity costs by $25 per year. Support for the policy dropped 14 percentage points compared to the no-cost question, but there was still majority (58%) support. In the third question, respondents were told the renewable energy requirement would increase electricity costs by $50 per year. Overall support for this third option dropped an additional 13 percentage points to 45%, while opposition grew to 49%.

Figure 4a. Agree/disagree states should require increased use of renewable energy, with and without a cost specified[e]



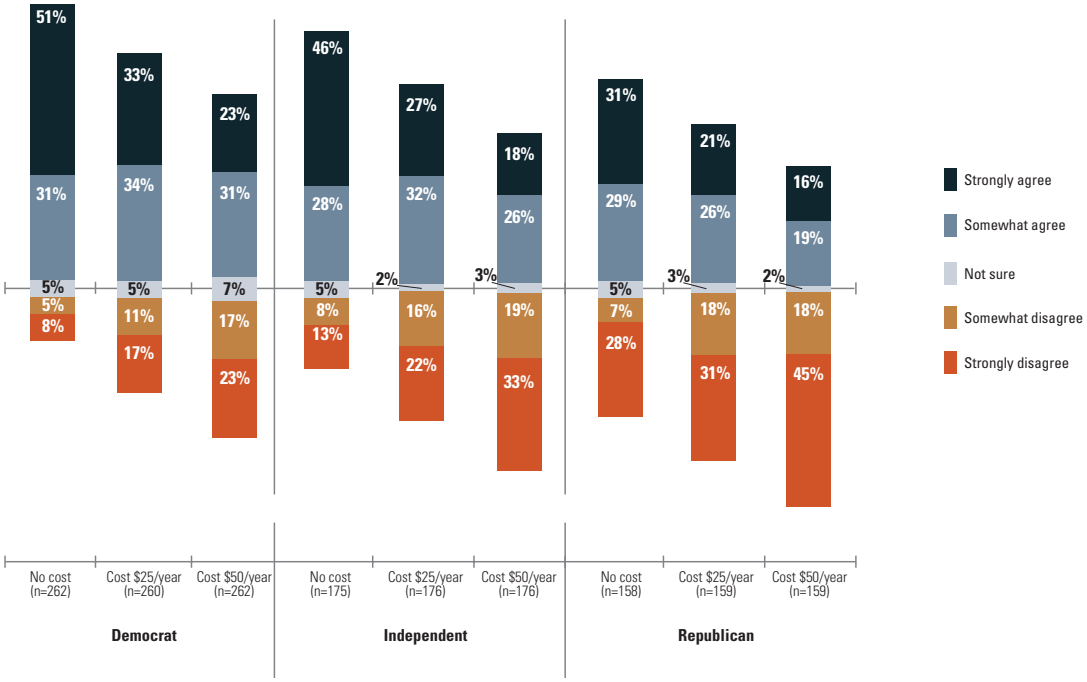
Source: Spring 2015 NSEE

e Question text (no cost): "Please identify your level of agreement with the following statements regarding energy policy. For each statement please indicate if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree. State governments should require a set portion of all electricity to come from renewable energy sources such as wind and solar power."

Question text (with cost): "Please identify your level of agreement with the following statements regarding energy policy. For each statement please indicate if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree. State governments should require a set portion of all electricity to come from renewable energy sources such as wind and solar power even if it increases the cost of electricity by about [25, 50] dollars per family per year."

This price sensitivity is not limited to any one group. Support among Democrats dropped 15 points and 28 points, respectively, for the $25 per year and $50 per year cost scenarios (see *Figure 4b*). Republicans' support dropped by less: 13 points and 25 points, respectively. However, since Democrats started with higher baseline support (82%), there was still majority support among Democrats even under the $50 per year scenario. Republican support, by contrast, was only 60% under the baseline no-cost scenario and fell to 47% for an RPS with a $25 per year price-tag and just 35% if the policy were to add $50 per year to the cost of electricity.

Figure 4b. Agree/disagree states should require increased use of renewable energy, with and without a cost specified, by political affiliation[e]



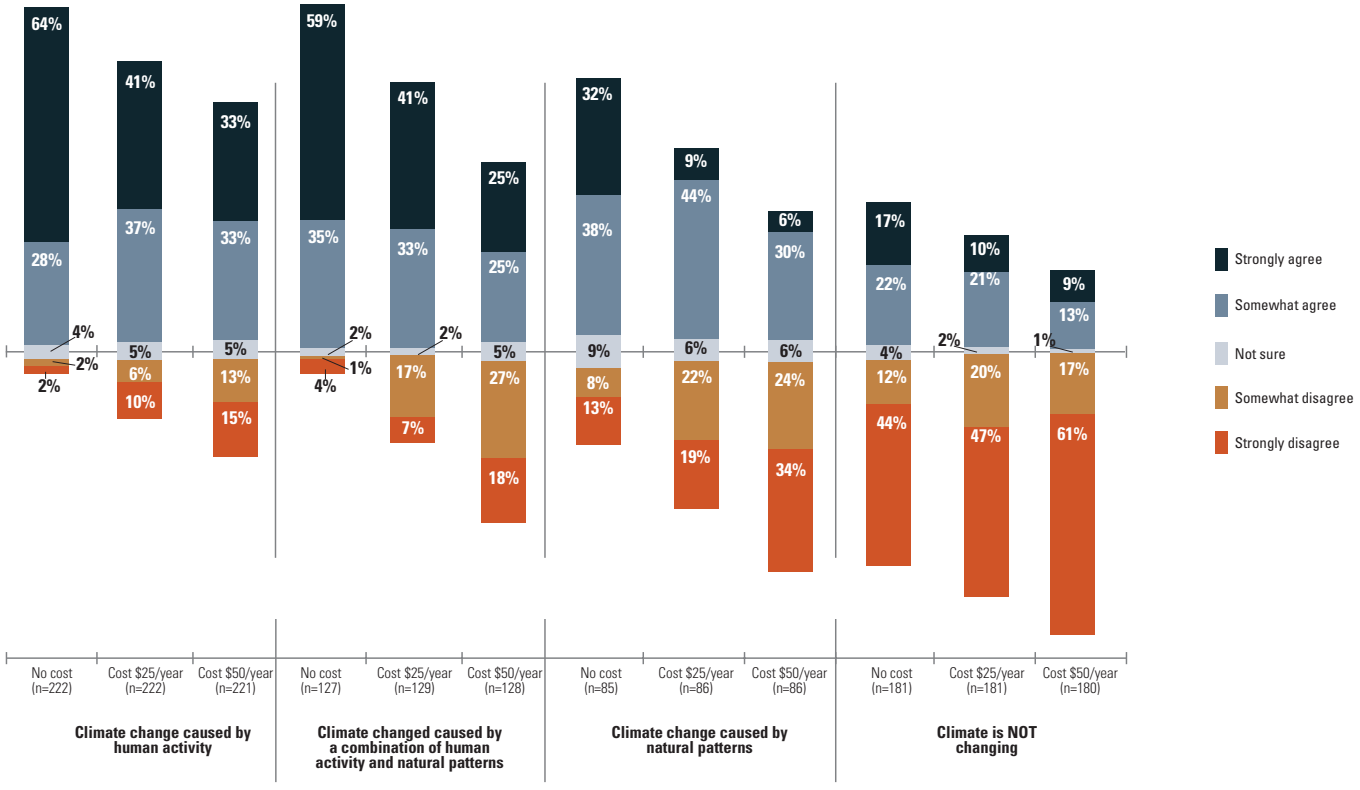
Source: Spring 2015 NSEE

These same across-the-board drops were also true regardless of one's stance on climate change (see *Figure 4c*). There was majority support for an RPS costing $25 per year among Americans who said there is evidence that the Earth is warming—regardless of its cause. But once the price rises to $50 per year, there was only majority support among those who said climate change is primarily caused by human activity (66%) and those who say it is caused by a combination of human activity and natural patterns (50%).

Among those who say the climate is not changing, there was only 39% support for an RPS with no cost. Support for an RPS among this group fell to 31% for a policy that would increase costs by $25 per year, and to just 22% for a policy leading to a $50 per year increase in the price of electricity.

Questions testing American price sensitivity to state renewable energy requirements included on two earlier NSEE waves produced results similar to the overall support/opposition data shown in *Figure 4a*. A split-sample experiment on the Fall 2013 survey found 79% support for an RPS when no cost was mentioned, compared to 45% overall support with a $100 per year pricetag.[19] [Note that while this overall support matches the $50 per year option described in the Spring 2015 test, there was less baseline support in the 2015 experiment.] Additionally, the Fall 2012 survey asked respondents first about a baseline RPS specifically achieving 25% renewables by 2025, and then the same policy but noting it would increase electricity prices 10%. Here, the drop in support was more limited, falling just 18 points from 78% under the baseline scenario to 60% with a cost applied.[20]

Figure 4c. Agree/disagree states should require increased use of renewable energy, with and without a cost specified, by stance on climate change[e,b,c]



Source: Spring 2015 NSEE

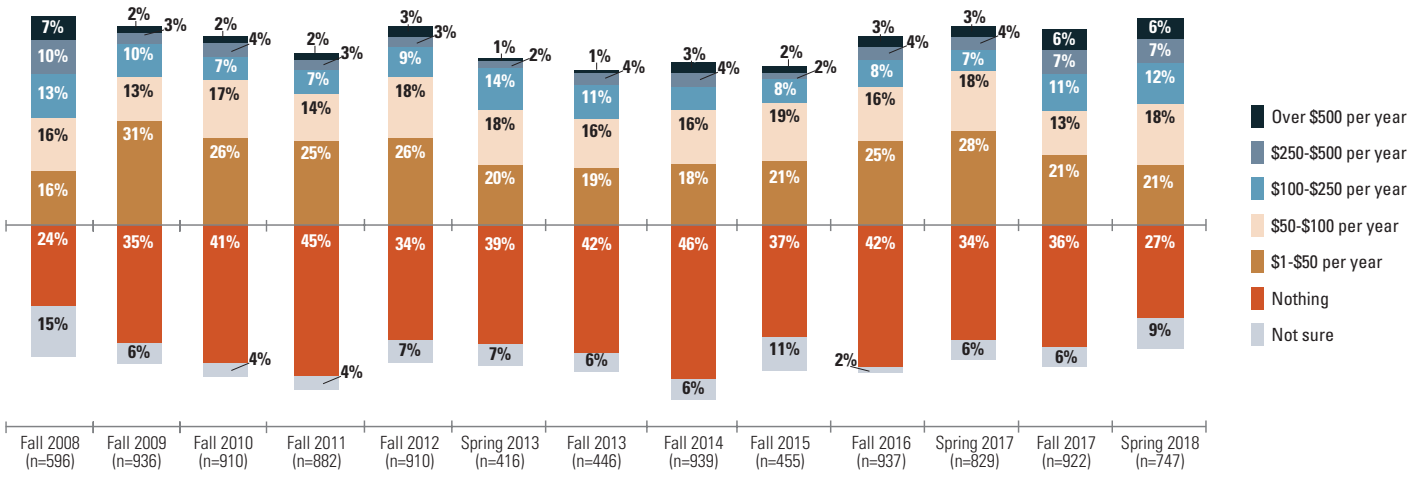
A Growing Portion of Americans Willing to Pay Much More for Renewable Energy

Another way that the NSEE has measured price sensitivity for state policies requiring additional renewable energy is asking directly about the respondent's willingness to pay for more renewable energy. The results largely support the findings from the Spring 2015 price sensitivity battery (presented in *Figure 4a*) that show a substantial drop in support for an RPS when a $25 or $50 per year price is applied.

Over time, the proportion of Americans who have said they were willing to pay at least some additional money each year for more renewable energy to be produced ranged from just 48% to 64% (by summing all bars above the x-axis in *Figure 5*). However, many Americans are only willing to pay a small amount—between $1 and $50 annually. The result is that, when asked about their willingness to pay, only roughly a third of Americans are willing to pay at least $50 per year.

Looking at willingness to pay over time, though, also shows that there is a small—but perhaps growing—proportion of Americans who have been willing to pay very large amounts of money in order for additional renewable energy to be produced. Looking across all NSEE survey waves, on average 8% of Americans have said they are willing to pay $250 or more per year for more renewable energy to be developed. On the two latest waves, however, 13% of the population have said they are willing to pay at least $250 per year. These waves have also found a larger-than-average proportion of Americans who say they are willing to pay between $100 and $250 per year. As a result, the Spring 2018 survey finds a quarter (25%) of Americans say they are willing to pay at least $100 per year for more renewable energy, up from the decade-long average of 17% (by summing the blue bars in *Figure 5*). This suggests potential for growth in green pricing programs, where customers can opt-in to pay a premium on their electricity bill for additional renewable energy.[21]

Figure 5. Willingness to pay for renewable energy[f]



Source: Fall 2008 – Spring 2018 NSEE waves

Note: The Spring 2013, Fall 2013, and Fall 2015 questions were asked as split-samples. Only responses to the standard question are included in this figure.

f Question text: "If it required you to pay extra money each year in order for more renewable energy to be produced, how much would you be willing to pay? Would you be willing to pay…?"

Democrats and Independents Most Willing to Pay a Premium for Renewable Energy

Democrats and Independents are largely responsible for the recent uptick in the number of Americans willing to pay large amounts of money for renewable energy. On the most recent survey, 29% of Democrats and 30% of independents say they would pay at least $100 per year for more renewable energy production, up from a decade-long average of 20% and 19%, respectively (see *Figure 6a*). The percentage of Republicans willing to pay at $100 more per year (19%) is also up from previous years, but only 5 percentage points over the 14% decade-long average.

Conversely, over the last decade, Republicans have been more likely than Democrats to answer that they were unwilling to pay more for additional renewable energy to be produced. While the numbers have fluctuated significantly over the past decade, on average, 45% of Republicans have said they were unwilling to pay a premium for renewables compared to 31% of Democrats (see *Figure 6b*). On the latest survey wave, these numbers are significantly down: just 32% of Republicans and 23% of Democrats say they are unwilling to pay more for renewable energy.

Figure 6a. Percentage of Americans willing to pay at least $100 per year for renewable energy, by political affiliation[f]

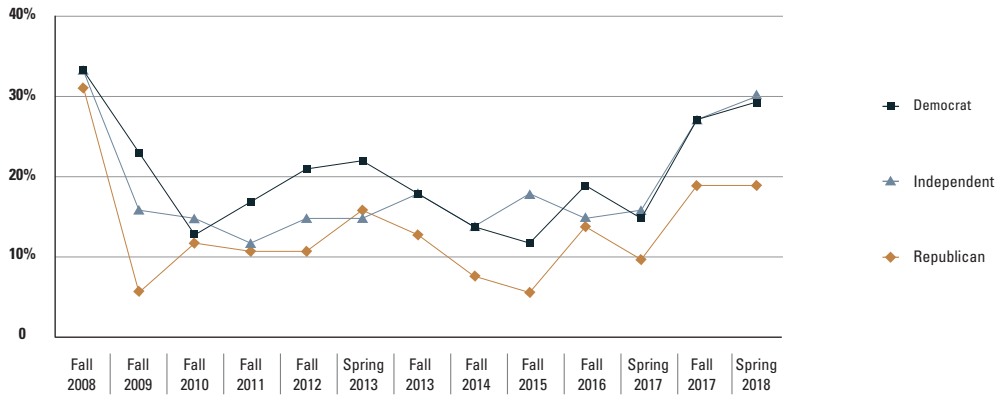
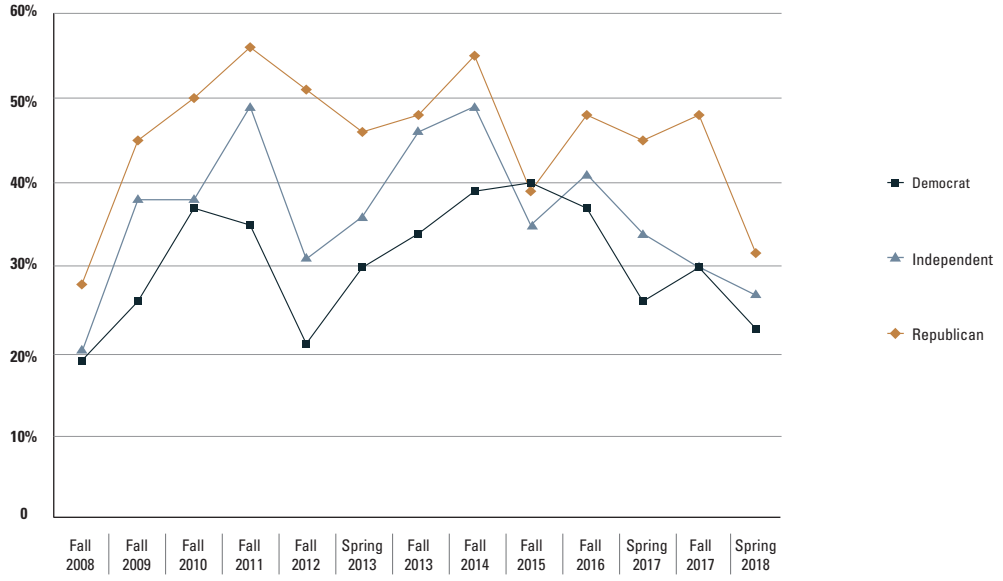


Figure 6b. Percentage of Americans unwilling to pay more for renewable energy, by political affiliation[f]



Source: Fall 2008 – Spring 2018 NSEE waves

Note: see Note 22 on page 25 for the sample size for each of the groups shown in the figures

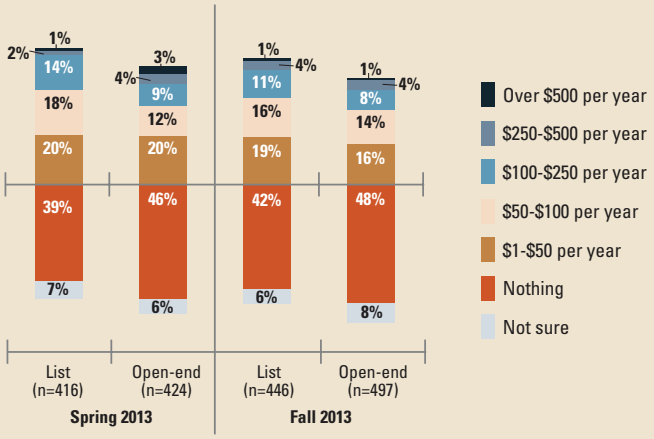
NSEE Experiments on Willingness to Pay

Over the last decade, the NSEE has conducted a number of experiments on willingness to pay. In these split-sample experiments, half of survey respondents receive the standard question wording, while the other half receive experimental wording.

One such series of experiments considers what happens when you ask the question open-ended, without giving a list. Survey research theory would suggest that the list helps to reduce the cognitive burden on respondents, but also suggests to them what might be considered the "normal" range, which might skew their response. Experiments in both Spring 2013 and Fall 2013 found that respondents were more likely to say they weren't willing to pay anything for more renewable energy when given an open-ended question. However, there were no statistically-significant differences in distribution across the categories of those who were willing to pay, suggesting that the list option is cognitively easier for respondents and likely doesn't skew responses (see figure below).

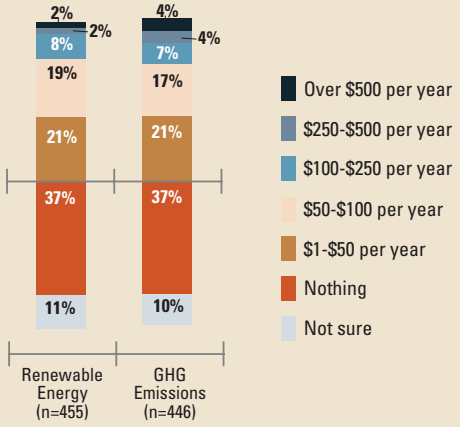
Another experiment tested willingness to pay for renewable energy versus willingness to pay to reduce greenhouse gas emissions. Since the NSEE typically finds the number of Americans who support renewable energy exceeds those who believe in climate change, we hypothesized that there would be greater willingness to pay for renewable energy rather than to reduce greenhouse gas emissions. In fact, responses to the split-sample experiment were nearly identical (see figure below).

Experiment testing willingness to pay for renewable energy with a list of responses versus open-ended



Question text: "If it required you to pay extra money each year in order for more renewable energy to be produced, how much would you be willing to pay?"

Experiment testing willingness to pay for renewable energy versus willingness to pay for greenhouse gas emissions reductions



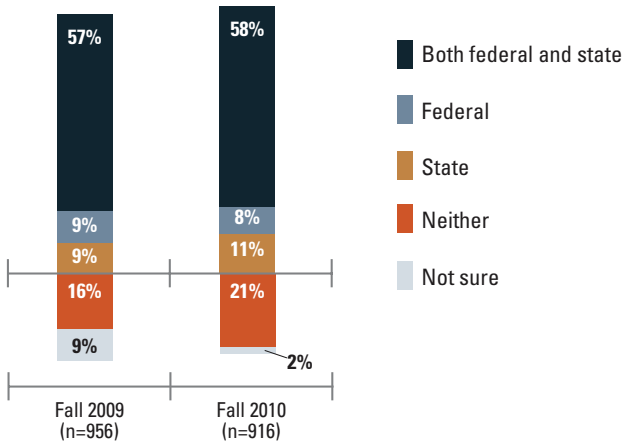
Question text (GHG emissions): "If it required you to pay extra money each year in order to reduce greenhouse gas emissions, how much would you be willing to pay? Would you be willing to pay…"

Americans Want Both Federal and State Renewable Energy Requirements

As mentioned in an earlier section, more than half of U.S. states have adopted a binding renewable portfolio standard (RPS), and these state-level policies have long been considered to be the driver of renewable energy expansion in the U.S.[23] While there have been some calls for a nationwide standard, to date there has been little traction for such a policy in Washington.[24]

The NSEE has found, however, that the American public would prefer that both the federal and state governments set renewable energy standards. Both times that the question was asked, roughly 10% of Americans supported a federal-only policy and an equal number supported a state-only policy (see *Figure 7*). However, more than half said they preferred that both the state and federal government adopt a renewable energy requirement. By contrast, only roughly 20% (16% in Fall 2009 and 21% in Fall 2010) said that neither level of government should set renewable energy requirements.

Figure 7. Preferred level of government to adopt renewable energy requirements[g]



Source: Fall 2009 and Fall 2010 NSEE waves

g Question text: "Next I'm going to provide you with a list of policies that can be used to limit the emission of greenhouse gases. For each option that I mention please tell if the policy should be adopted ONLY by the federal government, ONLY by your state government, by BOTH the federal and state governments, or should NOT be adopted by any government: Require a set portion of all electricity to come from renewable energy sources such as wind and solar power in order to reduce greenhouse gas emissions."

State Renewable Energy Requirements Seen as an Economic Opportunity, but Republicans Say Only If Neighbors Also Act

American support for state-level renewable energy requirements may be linked not only to climate benefits, but also to the perception that such mandates are good for the economy. Across NSEE survey waves, a majority of Americans have agreed with the idea that renewable energy requirements will boost state economies (see *Figure 8a*). There was strongest agreement with this statement on the inaugural NSEE survey in Fall 2008, which found 77% of Americans agreed that renewable energy requirements would be an economic boon for states. That number fell to 56% on the Fall 2013 survey, the last time it was asked.

Even then, however, there was net agreement across the political spectrum that state-level renewables requirements are good for state economies (see *Figure 8b*). On the Fall 2013 survey, a majority (65%) of Democrats said they agreed with the statement compared to 16% who disagreed, for 49% net agreement. A majority of Republicans (53%) also agreed that renewable energy requirements were good for state economies while 30% of Republicans disagreed with the statement, for 22% net agreement.

Figure 8a. Agreement/disagreement that state renewable energy requirements will boost state economies[h]

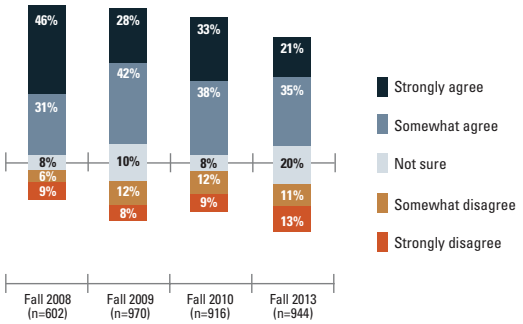
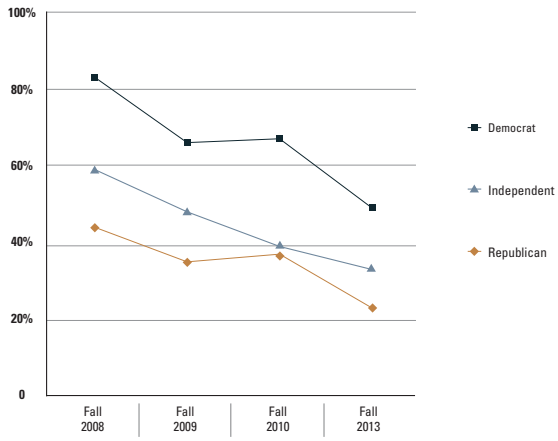


Figure 8b. Net agreement that state renewable energy requirements will boost state economies, by political affiliation[h]



Source: Fall 2008 – Fall 2013 NSEE waves

Note: see Note 25 on page 25 for the sample size for each of the groups shown in the figure

h Question text: "Please identify your level of agreement with the following statements. For each statement please indicate if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree. State governments will boost their economies by requiring greater use of renewable energy."

The perceived economic advantage of state renewable energy requirements change slightly, however, when respondents are asked about their state acting before neighboring states do so. On the five NSEE waves on which this question was asked, overall attitudes were evenly split (see *Figure 9a*). On the Fall 2008 and Fall 2010 surveys, slightly more Americans said that their state's economy would not be harmed by enacting renewable energy requirements ahead of neighboring states. On the Fall 2009 and Fall 2017 surveys, more Americans said that their state's economy would be harmed by acting ahead of neighbors.

Perhaps more telling, though, are the differences in how this plays out across the political spectrum. While Democrats and Republicans generally follow the same pattern from wave to wave, on each of the waves, Democrats posted net disagreement that their state's economy would be damaged if it enacted a renewable energy requirement ahead of neighboring states (see *Figure 9b*). By comparison, there was net agreement among Republicans on three of the five waves that enacting renewable energy requirements ahead of neighboring states would damage their state's economy.

It is unclear, though, whether this concern over economic impacts would actually diminish support for the policy; NSEE has previously reported that most Americans—including a plurality of Republicans—say their state should take action on climate change, regardless of what neighboring states choose to do.[26]

Figure 9a. Agreement/disagreement that state's economy will be damaged by enacting renewable energy requirements if neighboring states don't have such requirements[i]

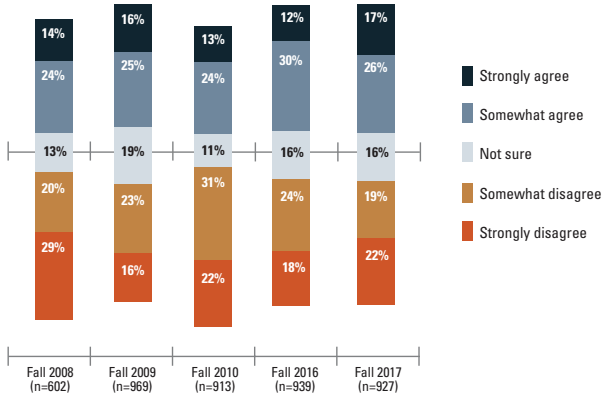
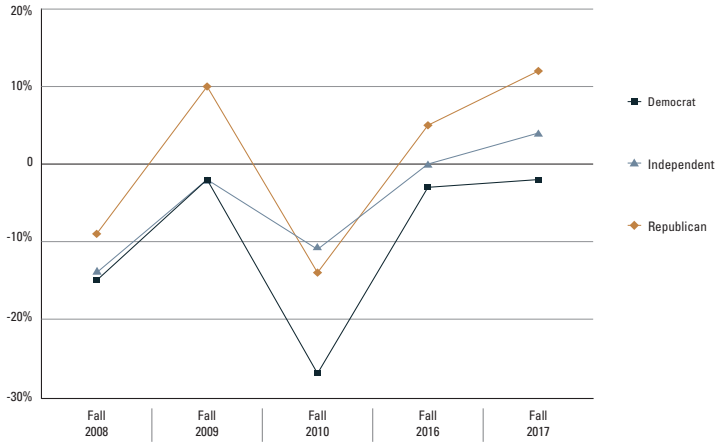


Figure 9b. Net agreement that state's economy will be damaged by enacting renewable energy requirements if neighboring states don't have such requirements, by political affiliation[i]



Source: Fall 2008 – Fall 2017 NSEE waves

Note: see Note 27 on page 25 for the sample size for each of the groups shown in the figure

i Please identify your level of agreement with the following statements. For each statement please indicate if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree. My state's economy will be damaged if it requires greater use of renewable energy while neighboring states don't have such requirements.

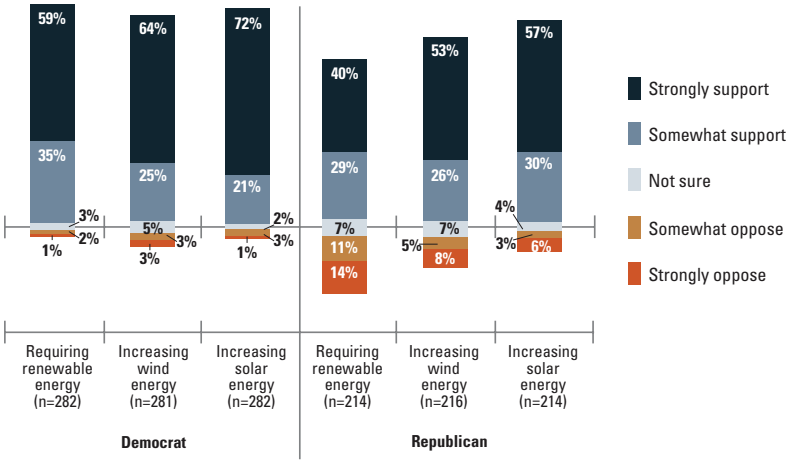
Support for Renewable Energy Even Higher If Not Government Mandated, Especially Among Republicans

So far, this report has considered public opinion on policies which require utilities to increase the share of renewable energy in their electricity mix. But how do Americans feel about utilities increasing the use of renewable energy if not compelled by government policy to do so? A June 2017 NSEE report,[28] based on data from the Spring 2017 survey, found that American support for increasing the use of wind and solar energy exceeds support for a policy requiring increased use of wind and solar. On the survey, 89% of all respondents supported increasing the use of solar energy in their state and 83% supported increasing the use of wind energy in their state. By contrast, 79% supported "requiring a set portion of all electricity to come from renewable energy sources such as wind and solar in your state."

Notably, though, there were differences based on political party. While a majority (69%) of Republicans said they were in favor of renewable energy requirements, even more were supportive of increasing the use of wind (79%) and solar (87%) outside of the context of a policy mandate (see *Figure 10*). This suggests that lower Republican support for renewable energy requirements may be less of a reaction to the technology itself than government intervention in the electricity market.

By contrast, Democrats were slightly more supportive of a renewable energy requirement than either of the specific renewable energy sources, especially wind energy. While 94% of Democrats supported a renewable energy requirement, 93% of those same respondents said they supported increasing the use of solar energy in their state and 89% said they supported increasing the use of wind energy. This suggests that there is at least a small portion of Democrats who generally support renewable energy—and even state requirements for it—but do not support particular renewable technologies, specifically wind energy.

Figure 10. Support/opposition to the following in respondent's own state, by political party [a,j]



Source: Spring 2017 NSEE

j Question text (increasing wind energy): "Now I would like to ask you a few questions about government policy designed to reduce greenhouse gas emissions. For each of the following policy options I read please indicate if you strongly support, somewhat support, somewhat oppose, or strongly oppose your state adopting that policy as a means of reducing emissions? Increasing the use of wind energy in your state."

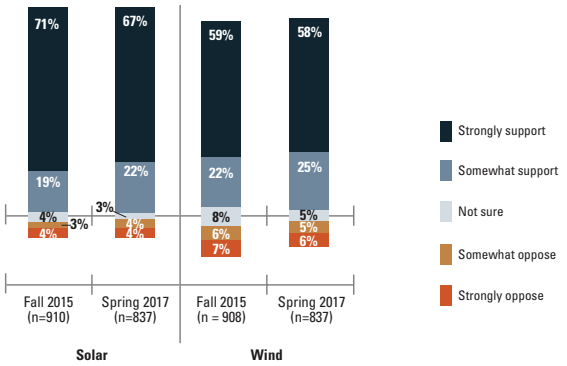
Question text (increasing solar energy): "Now I would like to ask you a few questions about government policy designed to reduce greenhouse gas emissions. For each of the following policy options I read please indicate if you strongly support, somewhat support, somewhat oppose, or strongly oppose your state adopting that policy as a means of reducing emissions? Increasing the use of solar energy in your state."

Stronger Support for Solar Over Wind May Be Linked to Perceptions of Reliability

The finding that Americans generally are more supportive of solar energy than wind energy was evident both on the Fall 2015 and Fall 2017 surveys. The Fall 2015 survey found a 9 percentage point spread in support: 90% supported increasing the use of solar energy compared to 81% who supported increasing the use of wind energy (see *Figure 11*). On the Spring 2017 survey, the spread was just 6 points, but there was a 9 point spread in strong support.

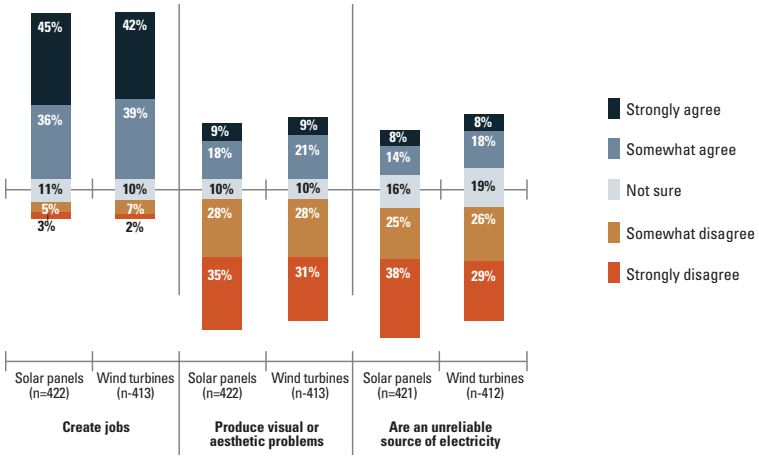
The Spring 2017 survey asked a small battery of questions about some of the perceived positive and negative impacts of each of these energy sources to try to understand this difference in support. There were no significant differences with respect to job creation or visual impact (see *Figure 12*). Overall, 81% of Americans said both solar and wind energy create jobs, while less than a third of Americans agreed that either pose visual or aesthetic problems (27% for solar; 30% for wind). However, there are statistically significant differences with respect to reliability. While most Americans disagree that solar panels (63%) or wind turbines (55%) are unreliable sources of electricity, this 9 point spread echoes the spread in support for the two technologies.

Figure 11. Support/opposition to increasing the use of solar, wind energy in own state[j,k]



Source: Fall 2015 and Spring 2017 NSEE waves

Figure 12. Agreement/disagreement with statements about the impacts of solar/wind energy[l]



Source: Spring 2017 NSEE

k Question text (Fall 2015): "Now I would like to ask you a few questions about government policy designed to reduce greenhouse gas emissions. The federal government has introduced a Clean Power Plan that is designed to reduce greenhouse gases from power plants. The plan lets states pick from a series of options in deciding on how to reduce power plant emissions. For each of the following policy options I read please indicate if you strongly support, somewhat support, somewhat oppose, or strongly oppose your state adopting that policy as a means of reducing emissions? Increasing the use of [solar/wind] energy in your state."

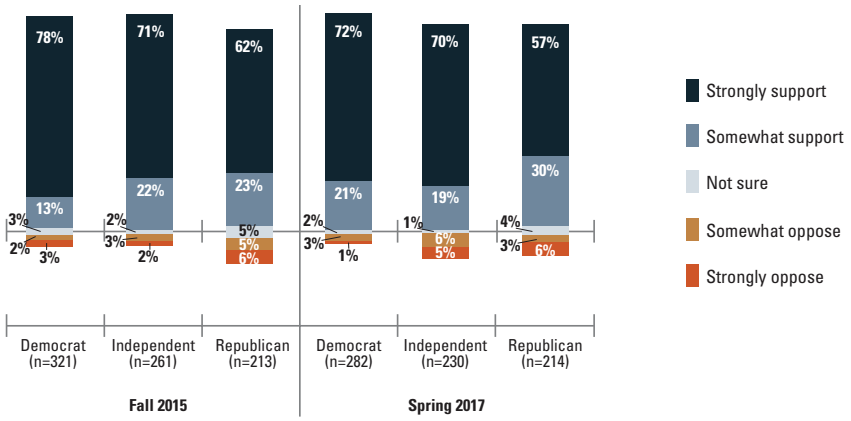
l Question text (create jobs): "Next I have a few questions about [solar panels, wind turbines]. For each of the following statements I read, please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement. [Solar panels, Wind turbines] create jobs."
Question text (visual or aesthetic problems): "Next I have a few questions about [solar panels, wind turbines]. For each of the following statements I read, please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement. [Solar panels, Wind turbines] produce visual or aesthetic problems."
Question text (unreliable): "Next I have a few questions about [solar panels, wind turbines]. For each of the following statements I read, please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement. [Solar panels, Wind turbines] are an unreliable source of electricity."

Democrats & Republicans Hold Similar Views on Increasing Use of Solar, Wind

While there are some small differences in support for solar and wind energy between Democrats and Republicans, they are not nearly as marked as for other questions on the NSEE.

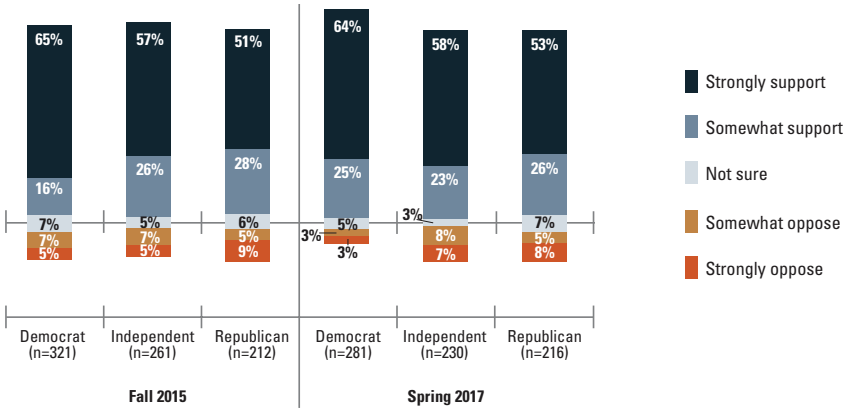
On increasing the use of solar energy in one's own state, there was a 6 percentage point gap in support between the two groups on both the Fall 2015 and Spring 2017 waves (see *Figure 13*). For wind energy, the gap was just 2 points in Fall 2015 and 10 points in Spring 2017 (see *Figure 14*). Even then, though, 79% of Republicans said they supported increasing the use of wind energy. There are bigger differences between the two parties in strength of support, with higher numbers of Democrats saying they strongly support solar and wind. But this is really just a matter of degree: In all cases, an outright majority of Republicans said they strongly supported increasing the use of both solar and wind.

Figure 13. Support/opposition to increasing the use of solar energy in own state, by political affiliation[j,k]



Source: Fall 2015 and Spring 2017 NSEE waves

Figure 14. Support/opposition to increasing the use of wind energy in own state, by political affiliation[j,k]



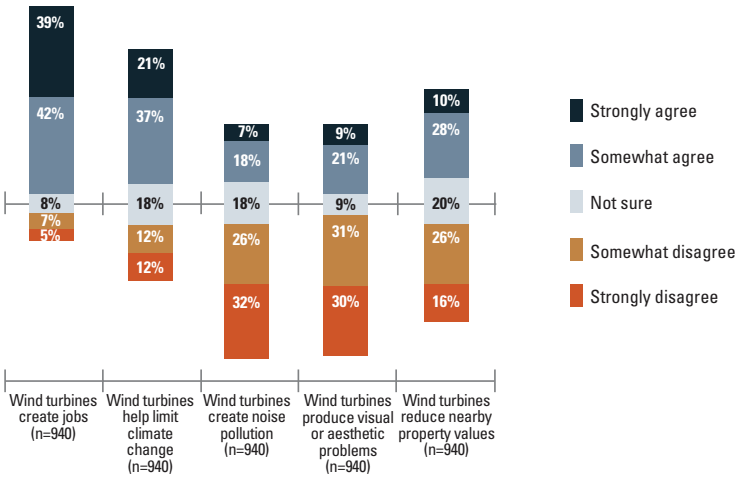
Source: Fall 2015 and Spring 2017 NSEE waves

Majority Support Wind Energy in Own Community; Those Who Oppose Turbines Have Concerns Over Property Value Impacts

The Fall 2016 NSEE included additional questions on wind energy: both whether people were supportive of hosting wind turbines in their own community, and the perceived positive and negative impacts of wind development. Overall, a majority (78%) of Americans said they would support wind turbines being placed in their community, while just 18% opposed such a plan.[29] Furthermore, a majority of Americans agree with the positive statements posed about wind energy: that they create jobs (81%) and help limit climate change (58%), as shown in *Figure 15*. A majority of respondents also disagreed with two negative statements about wind energy: that they create noise pollution (58%) and cause visual or aesthetic problems (61%). Respondents were split, however, on whether they believed wind turbines reduce nearby property values: 38% of Americans agreed with the statement that turbines decrease nearby property values, while 42% disagreed with the statement.

This split in opinions about the effect of wind turbines on nearby property values does not appear to be linked to political party, and there is only a slight difference based on stance toward climate change. Instead, there is a more pronounced difference between those who say they would support having wind turbines in their community and those who say they would oppose such a plan (see *Figure 16*). While roughly a third (34%) of those who support having wind turbines in their community think property values might be affected, the same is true among 58% of those who oppose having wind turbines in their community. Peer-reviewed studies from the U.S. have found no evidence of impacts on property values near wind turbines.[30] Even so, it appears concern over property value impacts may be part of the reason a smaller portion of the public say they are supportive of hosting turbines in their community compared to those who are generally supportive of increasing the use of wind energy in their state.

Figure 15. Agreement/disagreement with perceived impacts of wind turbines[m]



Source: Fall 2016 NSEE

m Question text (jobs): "For each of the following statements I read about the impacts of wind turbines, please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement. Wind turbines create jobs."

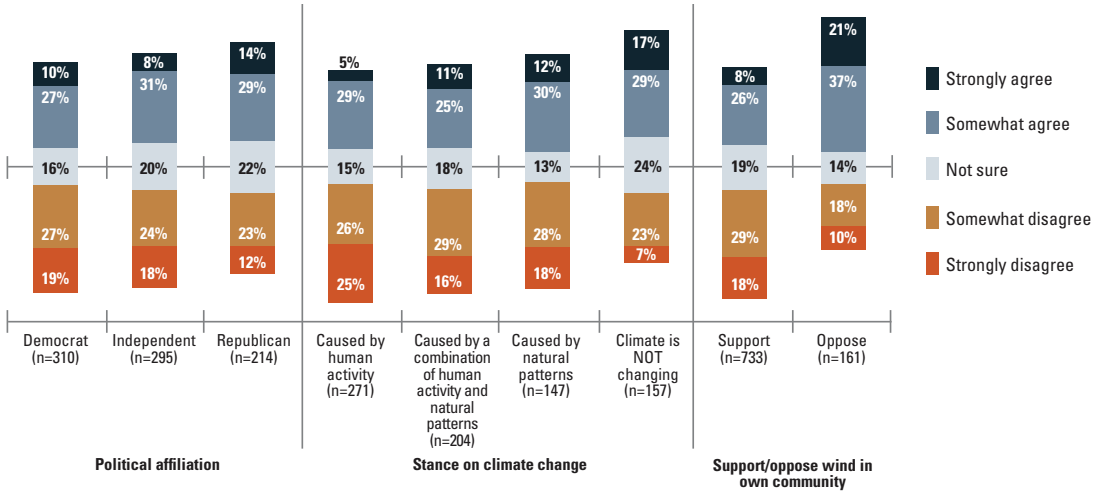
Question text (climate change): "For each of the following statements I read about the impacts of wind turbines, please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement. Wind turbines help limit climate change."

Question text (noise pollution): "For each of the following statements I read about the impacts of wind turbines, please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement. Wind turbines create noise pollution."

Question text (property values): "For each of the following statements I read about the impacts of wind turbines, please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement. Wind turbines reduce nearby property values."

Question text (visual problems): "For each of the following statements I read about the impacts of wind turbines, please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement. Wind turbines produce visual or aesthetic problems."

Figure 16. Agreement/disagreement that wind turbines reduce nearby property values[m,n]



Source: Fall 2016 NSEE

Report Highlight: Support for Net Metering

A September 2017 report provided an in-depth look at support for net-metering, the policy that allows utility customers with onsite electricity sources such as solar panels to sell the excess energy they generate back to the electric grid. The report, based on data from the Spring 2017 NSEE, found:

- 76% of Americans support net metering.
- Support of net metering is highest among self-identified liberals and younger Americans, but even so, a majority of political moderates, conservatives, and Americans aged 50 and over say they support net metering.
- Even a majority (64%) who believe there is not solid evidence of climate change support the policy.

The full report is available on the NSEE website at: http://closup.umich.edu/issues-in-energy-and-environmental-policy/32/

n Question text (support/oppose wind in own community): "Assuming there were suitable locations for them, would you strongly support, somewhat support, somewhat oppose or strongly oppose wind turbines being placed in your community?"

Conclusion

Over the last decade, the NSEE has found a broad base of support for increasing the use of renewable energy through state-level requirements or RPSs. This support spans the political spectrum as well as the range of stances on anthropogenic climate change. Even so, this is not necessarily a policy area that Americans follow closely, nor is it one that most are willing to put much money behind. More than half don't know if their state has a renewable energy requirement, and fewer than half are willing to pay a $50 per year premium for additional renewable energy. Even so, there appears to be a small but growing portion of Americans who say they are willing to pay substantially more—upwards of $100 annually—for additional renewable energy, suggesting there may be a growing pool of interest in voluntary green pricing programs. These voluntary programs may also resonate well with a subset of Americans—most of whom are Republicans—who are supportive of increasing the use of solar and wind energy, but who are opposed to government policies mandating that shift.

Data from the NSEE also suggests that Americans may be more supportive of solar energy than wind energy due to a perception that solar is more reliable, and that concerns over property value impacts may account for some of Americans' opposition to having wind turbines in their community compared to noise or visual impacts.

Methods

The NSEE is a biannual telephone survey of a random sample of adult (age 18 and over) residents of the United States. The sample size, balance of landline and cell phone numbers, and response rate varies from wave to wave. Methodological details about each of the survey waves are available on the CLOSUP website: www.closup.umich.edu/nsee.

Funding, Financial Disclosure, and Research Transparency

Funding for the NSEE surveys to-date has been provided by general revenues of the University of Michigan Center for Local, State, and Urban Policy, and the Muhlenberg College Institute of Public Opinion. The authors did not accept any stipend or supplemental income in the completion of the survey or the reports from this survey. The NSEE is committed to transparency in all facets of our work, including timely release and posting of data from each survey wave, including providing online access to NSEE survey instruments, data tables, and downloadable datasets.

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Notes

1. U.S. Energy Information Administration. (2016, March 16). Natural gas expected to surpass coal in mix of fuel used for U.S. power generation in 2016. *Today in Energy*. Retrieved from https://www.eia.gov/todayinenergy/detail.php?id=25392

2. Business Council for Sustainable Energy and Bloomberg New Energy Finance. (2018). *Sustainable energy in America factbook*. Retrieved from http://www.bcse.org/sustainableenergyfactbook/

3. Authors compiled capacity additions from the EIA Electric Power Annual reports 2009-2016 (available at: https://www.eia.gov/electricity/annual/), and EIA-860 2017 early release (available at: https://www.eia.gov/electricity/data/eia860/).

4. Carley, S., Davies, L. L., Spence, D. B., & Zirogiannis, N. (2018). Empirical evaluation of the stringency and design of renewable portfolio standards. *Nature Energy, 3*, 754-763. https://doi.org/10.1038/s41560-018-0202-4

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6. U.S. Department of Energy, Database of State Incentives for Renewables & Efficiency, and North Carolina Clean Energy Technology Center. (2017). *Renewable portfolio standard policies* [figure]. Retrieved from http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2017/03/Renewable-Portfolio-Standards.pdf

7. Orcutt, M. (2012, August 17). Does the wind production tax credit matter? *MIT Technology Review.* Retrieved from https://www.technologyreview.com/s/428927/does-the-wind-production-tax-credit-matter/

8. Barbose, G. (2017). *U.S. Renewables Portfolio Standards 2017 Annual status report*. Berkeley, CA: Lawrence Berkeley National Laboratory. Retrieved from https://emp.lbl.gov/sites/default/files/2017-annual-rps-summary-report.pdf

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10. Trabish, H. K. (2018). Modernizing renewables mandates is no longer about the megawatts. *Industry Dive.* Retrieved from https://www.utilitydive.com/news/modernizing-renewables-mandates-is-no-longer-about-the-megawatts/529895/

11. The sample size for each of the groups shown in *Figure 2a* is:

	Fall 2008	Fall 2009	Fall 2010	Spring 2012	Spring 2013	Fall 2013	Spring 2015	Fall 2016	Spring 2017	Fall 2017
Democrat	197	342	373	229	317	168	262	309	282	270
Republican	149	239	214	171	192	117	158	215	214	216
Independent	150	309	206	187	228	139	175	296	230	265

12. Fitzpatrick, N. B., Rabe, B. G., Mills, S. B., Borick, C., & Lachapelle, E. (2018). American opinions on carbon taxes and cap-and-trade: 10 years of carbon pricing in the NSEE. *Issues in Energy and Environmental Policy, 35*. Ann Arbor, MI: Center for Local, State, and Urban Policy at the Gerald R. Ford School of Public Policy, University of Michigan. Retrieved from http://closup.umich.edu/issues-in-energy-and-environmental-policy/35/ ; Mills, S. B., Fitzpatrick, N. B., Rabe, B. G., Borick, C., & Lachapelle, E. (2018). Fuel economy, electric vehicle rebates, and gas taxes: 10 years of transportation policies in the NSEE. *Issues in Energy and Environmental Policy, 38*. Ann Arbor, MI: Center for Local, State, and Urban Policy at the Gerald R. Ford School of Public Policy, University of Michigan. Retrieved from http://closup.umich.edu/issues-in-energy-and-environmental-policy/38/fuel-economy-electric-vehicle-rebates-and-gas-taxes-10-years-of-transportation-policies-in-the-nsee/

13. The sample size for each of the groups shown in *Figure 2b* is:

	Fall 2008	Fall 2009	Fall 2010	Spring 2012	Spring 2013	Fall 2013	Spring 2015	Fall 2016	Spring 2017	Fall 2017
Climate change caused by human activity	147	236	194	172	230	119	222	271	258	327
Climate change caused by a combination of human activity and natural patterns	182	307	216	215	233	112	127	204	202	165
Climate change caused by natural patterns	79	77	96	66	62	62	85	148	101	108
Climate is NOT changing	100	188	240	173	185	115	181	156	156	171

14. U.S. Department of Energy, Database of State Incentives for Renewables & Efficiency, and North Carolina Clean Energy Technology Center. (2016). *Energy efficiency resource standards (and goals)* [figure]. Retrieved from http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2016/10/Energy-Efficiency-Resource-Standards.pdf

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16. Question text (Fall 2008): "For each idea that I mention please tell me if you strongly support, somewhat support, somewhat oppose, or strongly oppose the proposed ways states can reduce greenhouse gas emissions: State governments should require an increase in energy efficiency for residential and commercial buildings and appliances."
Question text (Fall 2014): "The new federal Clean Power Plan lets states pick from a series of options in deciding on how to reduce power plant emissions. For each of the following policy options I read please indicate if you support or oppose your state adopting that policy as a means of reducing emissions? Requiring increased energy efficiency standards for new homes and appliances in your state."
Question text (Fall 2015): "The federal government has introduced a Clean Power Plan that is designed to reduce greenhouse gases from power plants. The plan lets states pick from a series of options in deciding on how to reduce power plant emissions. For each of the following policy options I read please indicate if you strongly support, somewhat support, somewhat oppose, or strongly oppose your state adopting that policy as a means of reducing emissions? Requiring increased energy efficiency standards in your state."
Question text (Spring 2017): "For each of the following policy options I read please indicate if you strongly support, somewhat support, somewhat oppose, or strongly oppose your state adopting that policy as a means of reducing emissions? Requiring increased energy efficiency standards in your state."
Question text (Fall 2017): "For each idea that I mention please tell me if you strongly support, somewhat support, neither support nor oppose, somewhat oppose, or strongly oppose the proposed ways to reduce greenhouse gas emissions. State governments should require an increase in energy efficiency for residential and commercial buildings and appliances."
The sample size for each of the groups shown in the *Figure* is:

	Fall 2008	Fall 2014	Fall 2015	Spring 2017	Fall 2017
Climate change caused by human activity	147	252	249	259	327
Climate change caused by a combination of human activity and natural patterns	183	172	236	201	164
Climate change caused by natural patterns	80	111	123	101	107
Climate is NOT changing	100	220	142	156	168

17. Barbose, G. (2017). *U.S. Renewables Portfolio Standards 2017 Annual status report.* Berkeley, CA: Lawrence Berkeley National Laboratory. Retrieved from https://emp.lbl.gov/sites/default/files/2017-annual-rps-summary-report.pdf

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19. Question text and topline results are available on the NSEE webtables: http://closup.umich.edu/national-surveys-on-energy-and-environment/nsee-data-tables/nsee-2013-fall/#Q25

20. Question text and topline results are available on the NSEE webtables: http://closup.umich.edu/national-surveys-on-energy-and-environment/nsee-data-tables/nsee-2012-fall/#Q31

21. Center for Climate and Energy Solutions. (2017). *Green pricing programs* [map]. Retrieved from https://www.c2es.org/document/green-pricing-programs/

22. The sample size for each of the groups shown in *Figures 6a & 6b* is:

	Fall 2008	Fall 2009	Fall 2010	Fall 2011	Fall 2012	Spring 2013	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Spring 2017	Fall 2017	Spring 2018
Democrat	193	342	373	284	310	138	155	328	166	310	278	269	223
Independent	150	309	205	260	281	118	130	268	126	295	229	263	229
Republican	150	239	214	183	190	102	112	205	103	214	214	215	161

23. Rabe, B. G. (2004). *Statehouse and greenhouse: The emerging politics of American climate change policy.* Washington, DC: Brookings Institution Press.

24. Center for Climate and Energy Solutions (C2ES) and Regulatory Assistance Project. (2011). *Clean energy standards: State and federal policy options and implications*. Arlington, VA: C2ES. https://www.c2es.org/site/assets/uploads/2011/11/Clean-Energy-Standards-State-and-Federal-Policy-Options-and-Implications.pdf See, especially, page 67, endnote 91.

25. The sample size for *Figure 8b* is:

	Fall 2008	Fall 2009	Fall 2010	Fall 2013
Democrat	197	344	372	317
Independent	152	310	207	302
Republican	149	241	215	213

26. Mills, S. B., Fitzpatrick, N. B., Rabe, B. G., Borick, C., & Lachapelle, E. (2018). Should state and local governments address climate change? 10 years of climate federalism in the NSEE. *Issues in Energy and Environmental Policy, 34*. Ann Arbor, MI: Center for Local, State, and Urban Policy at the Gerald R. Ford School of Public Policy, University of Michigan. Retrieved from http://closup.umich.edu/issues-in-energy-and-environmental-policy/34/ See page 10.

27. The sample size for *Figure 9b* is:

	Fall 2008	Fall 2009	Fall 2010	Fall 2016	Fall 2017
Democrat	196	343	372	310	271
Independent	151	309	206	295	266
Republican	149	241	215	215	216

28. Mills, S. B., Rabe, B. G., & Borick, C. (2017). Strong public support for state-level policies to address climate change. *Issues in Energy and Environmental Policy, 31*. Ann Arbor, MI: Center for Local, State, and Urban Policy at the Gerald R. Ford School of Public Policy, University of Michigan. Retrieved from http://closup.umich.edu/issues-in-energy-and-environmental-policy/31/strong-public-support-for-state-level-policies-to-address-climate-change/

29. Question text: "Assuming there were suitable locations for them, would you strongly support, somewhat support, somewhat oppose, or strongly oppose wind turbines being placed in your community?" See NSEE webtables for complete breakdowns: http://closup.umich.edu/national-surveys-on-energy-and-environment/nsee-data-tables/nsee-2016-fall/#Q42

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Reports from National Surveys on Energy and Environment

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NSEE Public Opinion on Climate Policy Options (December 2012)

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